

# HH3U: Hammerhead-3U-cPCI

Quad ADSP-21160 3U cPCI Board

## Preliminary Technical Data

### Four ADSP-21160 DSPs on cPCI Interface

BittWare's Hammerhead-3U-cPCI (HH3U) packs the processing power of four ADSP-21160 SHARC DSPs and the speed of a 66 MHz PCI interface on a 3U CompactPCI board. The board also features 64-512 MB of SDRAM, 2 MB of FLASH RAM, and a PMC+ site.

### SharcFIN ASIC for SHARC DSPs

The HH3U incorporates BittWare's SharcFIN ASIC, which flexibly interfaces the ADSP-21160 DSPs to the 64-bit, 66 MHz PCI bus, the SDRAM, the FLASH memory, and a peripheral bus. It also provides a feature-rich set of DMA functions and interrupt options to support very high-speed, real-time data flow with a minimum of processor overhead.

### ADSP-21160 DSPs

The HH3U is configured with four 100 MHz ADSP-21160 DSPs, each of which feature 4 Mb of dual-ported on-chip SRAM. The ADSP-21160s are code-compatible with the ADSP-2106x SHARC DSPs, making it easier to integrate existing code. The four ADSP-21160 DSPs share a common 50 MHz, 64-bit cluster bus, which gives them access to the board's SDRAM, the PCI bus interface, and the other three SHARC processors. For additional I/O, each processor also has four flags, three interrupts, six link ports, and two serial ports.

### Back Panel I/O

A back panel connector (P2) on the HH3U is used for back panel I/O, providing four link ports, a serial TDM bus, and an RS-232 connection.

### PMC+ Site

The HH3U features a 64-bit, 66 MHz PMC+ site. The PMC+ (PCI Mezzanine Card) site has front-panel access and allows you to attach a standard PMC module to the board, adding I/O or additional processors and memory. The PMC+ site also functions as a proprietary interface that allows you to attach BittWare's PMC+ I/O modules for high-performance, low-latency I/O via four 100 MB/s link ports and one 50 Mb/s serial port.

### Available Development Tools

BittWare offers a complete software development kit that allows you to easily develop application code and integrate the HH3U into your system. The software tools include a comprehensive host interface library (HIL), a standard I/O library, and diagnostic utilities. The board is fully compatible with Analog Devices' VisualDSP® code development tools and supports in-circuit emulation. It is also compatible with SpeedDSP, BittWare's highly-optimized C-callable runtime libraries, and with SharCLAB, BittWare's interface to MATLAB Simulink® and Real-Time Workshop®.

## Features

- Four ADSP-21160 SHARC® DSPs running at 100 MHz (2400 MFLOPS)
- 64-bit, 66 MHz local PCI bus
- 32-bit, 66 MHz CompactPCI interface
- 64 to 512 MB SDRAM (standard 144-pin SODIMM)
- PMC+ site for standard PMC modules or for PMC+ low-latency, tightly coupled I/O modules
- Four links and 1 serial TDM bus for integrating BittWare's PMC+ I/O with on-board SHARC processors
- Four 100 MB/s external link ports via back panel
- One external 50 Mb/s serial TDM bus via back panel
- RS-232 UART
- 2 MB FLASH RAM
- Standalone operation



# Specifications

## BOARD ARCHITECTURE

### Processors

- Four Analog Devices ADSP-21160 SHARC DSPs
- 600 MFLOPs per DSP
- 4 Mb of on-chip dual-ported SRAM per DSP
- Integrated I/O processor with fourteen-channel DMA controller, six 100 Mbyte/sec link ports, and two 100 Mbit/sec serial ports

### External Memory

- 64-512 MB SDRAM (standard 144-pin SODIMM) available to the ADSP-21160s at 50 MHz
- 2 MB FLASH RAM available on 8-bit peripheral bus

### Link Ports

- 4 link ports extend from the ADSP-21160s (1 link from each) to back panel I/O
- 4 link ports extend from the ADSP-21160s (1 link from each) to the PMC+ site
- 16 link ports dedicated for interprocessor communication (bi-directional ring)
- Entire board is link bootable via back panel

### Serial Ports

- 1 serial TDM bus extends from the ADSP-21160s to back panel I/O
- 1 serial TDM bus extends from the ADSP-21160s to the PMC+ site
- 1 RS-232 connection to back panel

### SharcFIN™ ASIC

- 64/66 MHz PCI rev. 2.2 compliant interface (528 burst; 400 MB/s sustained)

## Ordering Information

HH3U-XY-ZZ

Processors = X

- 1 DSP = 1
- 2 DSPs = 2
- 4 DSPs = 4

ZZ = Speed\*

- 08 = 80 MHz
- 10 = 100 MHz

SDRAM = Y

- 64 MB = 5
- 128 MB = 6
- 256 MB = 7
- 512 MB = 8

\* Only available with 80 MHz

- SDRAM controller on SHARC bus; supports up to 512 MB
- SDRAM mapped to PCI memory space
- Programmable interrupt multiplexer: 10 inputs, 7 outputs (supports hardware interrupts in both directions)
- All ADSP-21160 IOP registers and internal SRAM are mapped to PCI memory space
- Supports host- and FLASH-based booting of ADSP-21160s
- 8-bit, 25 MHz peripheral bus
- Downward compatible with 32-bit, 33 MHz interfaces

### PMC+ Interface

- Provides connection to standard PMC modules
- Provides link and serial port connection to proprietary I/O modules for high-performance, low-latency I/O

### PCI Bridge

- Transparent 32-bit, 66 MHz single-load interface from PCI backplane to on-board 64-bit, 66 MHz PCI local bus

### Power

- 20W @ 3.3V worst case sustainable
- 1W @ 5V worst case sustainable

### Size

- 3U single slot (160mm x 100mm, 6.3"x3.9")

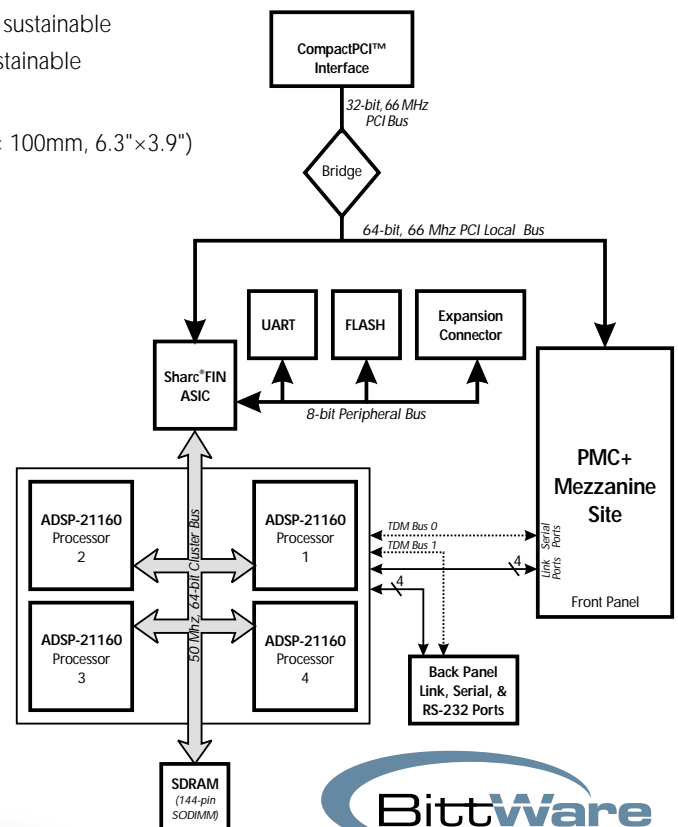
## SOFTWARE SUPPORT

### Host Interface

- BittWare's software development kit for Windows® 95/98/NT/2000 and Linux contains a C-callable library of board control and communications routines
- Porting kit available for other operating system platforms

### Development Tools

- Analog Devices' VisualDSP tools: C compiler, assembler, linker, simulator, and debugger
- BittWare VisualDSP Target for on-board debugging from host without an ICE
- White Mountain DSP ICE emulators
- Eonic Systems' Virtuoso™ operating system
- SharcLAB interface to MATLAB Simulink® and Real-Time Workshop®
- BittWare SpeedDSP optimized libraries



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